ORIGINAL

BEFORE THE ARIZONA CORPORATION COMMISSION

WILLIAM A. MUNDELL
CHAIRMAN
JIM IRVIN
COMMISSIONER
MARC SPITZER
COMMISSIONER

IN THE MATTER OF THE APPLICATION OF SUN CITY WATER COMPANY AND SUN CITY WEST UTILITIES COMPANY FOR APPROVAL OF CENTRAL ARIZONA PROJECT WATER UTILIZATION PLAN AND FOR AN ACCOUNTING ORDER AUTHORIZING A GROUNDWATER SAVINGS FEE AND RECOVERY OF DEFERRED CENTRAL ARIZONA PROJECT EXPENSES.	**DOCKET NOS.** W-01656A-98-0577 SW-02334A-98-0577 **SUN CITY TAXPAYERS ASSOCIATION'S NOTICE OF FILING DIRECT TESTIMONY**

Sun City Taxpayers Association ("SCTA"), by and through its attorney, hereby file the Direct Testimony of Dennis Hustead, Registered Civil Engineer with Hustead Engineering.

Respectfully submitted this 10th day of July, 2001.

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DIRECT TESTIMONY

OF

DENNIS HUSTEAD

On Behalf of

SUN CITY TAXPAYERS ASSOCIATION ("SCTA")

JULY 10, 2001

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DIRECT TESTIMONY OF
DENNIS HUSTEAD
DOCKET NOS. W-01656A-98-0577 and SW-02334A-98-0577

I. INTRODUCTION

Q. Please state your name, title and business address.

A. My name is Dennis Hustead. I am a Registered Civil Engineer with Hustead Engineering. My business address in 568 West Moon Valley Drive, Phoenix, Arizona, 85023.

Q. Please state your qualifications to testify in this matter.

A. I am a Registered Civil Engineer in the states of Arizona and California with thirty-five years experience. I have significant expertise in managing the planning and design of major public works and transportation projects throughout Arizona and California. My statement of professional qualifications was provided as Attachment DH-1 to my previous Testimony filed in this docket on September 10, 1999.

Q. Who are you testifying on behalf in this proceeding?

A. I am testifying on behalf of the Sun City Taxpayers Association ("SCTA").

Q. SCTA retained your services for what purpose?

A. I was retained by SCTA to review and evaluate the Preliminary Engineering Report (the "PER"), dated July 2000 and the Supplemental Engineering Report (the "Supplement"), dated December 18, 2000 for completeness, accuracy, compliance with the Arizona Corporation Commission's directives set forth in Decision No. 62293 and to determine whether the PER provides a proper basis

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on which to authorize Citizens to proceed with the Alternative recommended in the PER.

Q. Do you believe that the PER and Supplement are complete, accurate, comply with the Commission's Decision No. 62293 and provide a sound basis to authorize the expenditure of over 15 Million Dollars?

A. No. As I will explain more fully in my testimony, I believe that the PER is premised upon flawed assumptions and fails to properly evaluate the Alternatives in relation to the primary overall objective of the project—to maximize the benefits to the aquifer underlying the Sun Cities at the least cost to Citizens' ratepayers. While the Commission approved the "concept" of the Groundwater Savings Project, and authorized Citizens to proceed with a PER, the Decision did not find the concerns raised by the Residential Utilities Consumer Office ("RUCO"), the Commission's Staff, as well as myself on behalf of SCTA, in the hearing conducted October 18 and 19, 1999 to be without merit. To the contrary, the Commission ordered the PER specifically address: a) the feasibility of a joint project with the Agua Fria Division, including the timeframe for any such joint facility; b) the need for all major elements of proposed plans (including, without limitation, storage and booster stations); and c) binding commitments from golf courses, public and private, and the terms and conditions related thereto. The Commission, in Finding of Fact No. 24 in Decision No. 62293, further found that "while the use of CAP water will support the State's water policy goals, CAP water at any cost is not necessarily a prudent decision". Unfortunately, the PER reflects a very narrow focus and attempts to justify Citizens' existing proposal rather than identify and design a plan that will maximize benefits to the aquifer underlying the Sun Cities at the least cost to Citizens' ratepayers.

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II. THE PER FAILED TO ASSESS THE ALTERNATIVES IN THE CONTEXT OF THE OVERALL GOALS AND OBJECTIVES OF THE PROJECT

Q. Have you previously designed facilities to take untreated CAP water to golf courses?

A. Yes. I was Project Manager of the Reclaimed Water Delivery System ("RWDS") designed to deliver Central Arizona Project ("CAP") water or reclaimed water to up to twenty (20) golf courses in north Scottsdale. The project included approximately 15.5 miles of pipeline, two storage reserves and five pump stations.

Q. Were the goals and objectives of that project the same as faced by the Sun Cities?

A. The underlying motivating factors were entirely different in the RWDS. In Scottsdale, developers were willing to finance a CAP delivery system because that was the only way they could construct golf courses in connection with new subdivisions. The developers were very cost conscious and constantly reviewed the plans to ensure they would provide an adequate water delivery system at the least cost possible. The RWDS was designed as the primary water source for all the golf courses. Only eleven (11) golf courses were involved initially, but the RWDS was designed to ultimately meet water demands of twenty (20) golf courses. The goal and objective of the RWDS was to provide a dependable water supply to the golf courses.

In contrast, the Sun Cities already have existing golf courses and, except as I discuss further herein, have an existing water supply for these golf courses. The only reason for pursuing the project is to provide benefit to the aquifer

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underlying Citizens' service areas in the Sun Cities. Therefore, the primary focus of the PER should be to ensure that the benefit to the aquifer underlying Citizens' service areas in the Sun Cities is maximized at the lowest possible cost to ratepayers, not the mere delivery of the CAP allocations to Sun City West and Sun City, respectively. The requirement contained in Decision No. 62293 to evaluate "the need for all major elements" required the PER to evaluate all major elements of the proposal in the context of this overriding goal. Unfortunately, the PER ignored the primary purpose of the project.

Q. How would you have approached the evaluation of Citizens' proposal for a groundwater savings project?

A. I would have attempted to review all Alternatives, which would maximize the goal (i.e., the benefits to the aquifer underlying the Sun Cities while minimizing the costs), and compare the Alternatives based upon their relative costs to achieve the goal. Additionally, I would attempt to maximize the use of existing facilities, minimize the need for new facilities, obtain partners to share the costs and eliminate components that are either unnecessary or are too costly in relation to the goal of benefiting the aquifer.

Q. Was this type of analysis performed in the PER or the Supplement?

A. No. The PER does not provide any confirmation or even analyze the benefits provided the aquifer by the various Alternatives being examined. Instead, the PER examines only whether the Alternative is capable of delivering 2,372 acre feet ("af") to the Sun City West golf courses and 4,189 af to the Sun City golf courses and the relative cost thereof.

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III. THE PER IS PREMISED UPON UNSUPPORTED ASSUMPTIONS

Q. In evaluating the PER, do you agree with the conclusions and recommended Alternative?

A. No.

Q. Why not?

A. There are significant factors that are either assumed as necessary components of the Plan or rejected without sufficient evaluation and explanation.

Q. Please explain to what factors and assumptions you are referring.

A. First, the Plan assumes that the project must be designed to deliver 2,372 af of CAP water to Sun City West golf courses and 4,189 af of CAP water to Sun City golf courses and to all golf courses expressing a willingness to participate. This assumption results in a recommendation to build an expensive and unnecessary distribution system in Sun City. The PER fails to assess how the new infrastructure can be minimized by maximizing use of existing facilities and maximizing deliveries to golf courses in Sun City West and, to the extent necessary at all, in the northern portion of Sun City.

Second, certain golf courses were entirely excluded from the process. The Recreation Centers of Sun City demanded exclusive right to use CAP water (PER at A-4). The Sun City Recreation Centers have no right to demand exclusive right to utilize CAP water. This eliminated consideration of three golf courses with an annual water demand of 1,875 af, two of which are north of Bell Road. This unwarranted demand should not have been accepted unless the golf courses accepted the additional costs associated with it. In Sun City

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West, two golf courses that currently utilize recovered effluent were summarily excluded from the Plan. The only reason given for excluding these two golf courses is: "These courses cannot participate in the GSP because they do not have groundwater rights." (PER at A-4) Based on this rationale alone, the PER eliminates consideration of an annual water demand of 1,015 (PER at B-11). I am aware of nothing that precludes Citizens from directly delivering CAP water to these golf courses, even though they do not have groundwater rights.

Third, the PER assumes every drop of the CAP allocation must be delivered to a golf course and that all golf courses expressing willingness to participate must be included in the Plan. The PER should have evaluated which deliveries were most cost effective.

Fourth, recharge was entirely ignored. Recharge should have been treated as a base case, with all Alternatives compared against recharge. Further, recharge should have been considered as a method of providing operational flexibility.

Fifth, the Beardsley Canal dry-up period was assumed to create insurmountable operational problems (PER at D-4). This was never substantiated and is not correct.

Sixth, the wheeling charge assumed for the Beardsley Canal was presented without negotiations of any kind (PER at D-4) skewing the PER to Alternative A.

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Seventh, the Recreation Centers of Sun City West's assertion that the existing system cannot be used to transport water West to East because of obligations to provide effluent was accepted without evaluation or analysis (PER at D-19).

Eighth, the existing effluent distribution system in Sun City West was considered without evaluation of any improvements (PER at D-19). Yet, by relatively simple improvements to the existing system, various Alternatives rejected or not studied at all by the PER become feasible.

Ninth, the text, individual summaries and cumulative summaries do not correlate with regard to booster station and right-of-way costs resulting in skewing the recommendation toward Alternative A.

Tenth, the PER assumes the golf courses have sufficient water rights to effectuate an exchange with Citizens. As indicated in Response to SCTA Data Request C-1.34, as of August 2005, 1,639 af of General Industrial Use Permits held by Sun City West Recreation Centers and Briarwood will expire, leaving 1,405.27 af of annual pumping not encompassed by an existing water right.

IV. FAILURE TO CONSIDER RECHARGE AS AN OPTION RENDERS THE PER INCOMPLETE

Q. Do you believe the PER is incomplete and inaccurate due to its failure to consider the recharge option?

A. Yes. When hearings were previously conducted on this matter in 1999, the Commission had not recognized recharge as meeting the used and useful criteria. Decision No. 62293 found that recharge could satisfy the used and useful criteria for ratemaking purposes. Additionally, the Agua Fria recharge

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site is now under construction, rather than a mere speculative possibility. Further, at a minimum, the PER should have considered recharge as both the base Alternative and as a method of taking a portion of the allocation if so doing would eliminate significant infrastructure cost.

V. THE PER FAILED TO ASSESS THE IMPENDING EXPIRATION OF GENERAL INDUSTRIAL USE PERMITS

Q. Do you have any specific concerns with the viability of the Alternatives that have been proposed?

A. Since this Plan has been designed as a groundwater exchange, the entity receiving water must have valid water rights in order to participate in the exchange. I have prepared a chart that demonstrates that upon expiration of the current Industrial Use Permits currently utilized by the participating golf courses in Sun City West, in August 2005 there will be a deficiency of 1,405.27 af per year, meaning existing water rights are insufficient to cover the annual usage anticipated by the participating golf courses on an average year. See, Attachment DH-6. (Note, numbering of Attachments continue from my pre-filed testimony submitted September 10, 1999.) The deficiency will increase in heavy water use years and will decrease in low water use years. During an average year, the participating golf courses will have rights to receive only 2,329.73 af of groundwater, which will also constitute the maximum amount of CAP water that can be exchanged. This amount does not even reach the 2,372 af of CAP water available to Sun City West Utilities, Inc. ("SCW"). The PER did not address this deficiency at all.

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Q. If the participating golf courses have insufficient grandfathered rights to exchange for CAP water, does that preclude the delivery of CAP water to the golf courses?

A. It does under the Plan proposed by Citizens. However, the golf courses are within the boundaries of Citizens' service areas. Citizens can deliver CAP water to any of these golf courses without an "exchange" agreement. However, Citizens would not be able to characterize its withdrawals of groundwater as CAP water.

Q. What benefits to the aquifer are derived by Citizens characterizing its withdrawals as CAP water?

A. There is no advantage to the aquifer. In fact, it is conceivable, depending on how the Department accounts for CAP water withdrawn by Citizens, that characterizing withdrawals of pumped water as CAP water would negatively impact the aquifer.

Q. How could characterizing withdrawals as CAP allow Citizens to negatively impact the aquifer?

A. Citizens has to meet conservation requirements as well as assured water supply rules. CAP water is deemed a renewable resource. Therefore, to the extent Citizens is deemed to be utilizing CAP water, it is more likely to meet assured water supply standards and conservation requirements. This all depends on how the Department actually accounts for the CAP water both with regard to conservation requirements and assured water supply requirements. I am neither a hydrologist nor an expert on the Groundwater Management Act, therefore, I have not attempted to quantify the impact to Citizens. However, a complete

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PER should examine how characterizing Citizens' pumped water as CAP water may adversely impact the aquifer. The PER does not contain this analysis.

VI. THE LACK OF A HYDROLOGIC ANALYSIS RENDERS THE PER INCOMPLETE AND INADEQUATE

Q. Does the PER include any hydrologic analysis?

A. No. This is another major deficiency of the PER. Unlike the Scottsdale project where developers were paying the initial construction costs in order to provide an initial water source to golf courses, the purpose of this project is to maximize the benefits to the aquifer underlying the Sun Cities at the least cost to Citizens' ratepayers. The PER evaluates the Alternatives solely from the prospective of the cost of delivering 2,372 af to specific Sun City West golf courses and 4,189 af to specific Sun City golf courses. There is no attempt to evaluate the Alternatives in context to their impact on the aquifer or to compare them with the impact of recharge and direct delivery alternatives that are available.

Q. If a hydrological analysis is critical to evaluating the Alternatives, why haven't you and/or another expert for SCTA independently performed the analysis?

A. Such an analysis is beyond my expertise. It is my understanding that SCTA did not pursue a separate hydrological analysis for this hearing because of the limited nature of this evidentiary hearing as framed by the Procedural Order, limited time, and limited finances.

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Q. Do you believe that such a hydrologic analysis should be performed and evaluated prior to the Commission authorizing Citizens to proceed with this project?

A. As I have indicated, the focus of this project and the main reason it is being pursued at all is the belief that it would provide more direct benefits to the aquifer underlying the Sun Cities instead of the less costly recharge projects (such as the Agua Fria Recharge—estimated to cost as little as $4.00 per af to use). While logically it seems likely that eliminating use of groundwater within the Sun Cities would provide greater direct benefits to the aquifer than recharging that water four or five miles north of the Sun Cities, I am not aware that any hydrologic evidence has ever been presented to this Commission (or to the CAP Task Force for that matter) comparing the hydrologic benefits of the two projects. Certainly, before the Commission authorizes imposing more than $15 million in direct construction costs and its related return as well as the annual operation and maintenance costs of this proposal on the ratepayers, it should require the Company to substantiate the underlying premise that led to this proposal in the first instance—that the aquifer underlying the Sun Cities will be benefited more directly and in an sufficient amount to justify this Plan over the less expensive recharge options. This requires a hydrologic analysis of comparing the various Alternatives to each other and to recharge as a base case.

In this regard, it is important to recognize that the technical advisors to the CAP Task Force substantially discounted the weight to be given the direct benefit of this project and as a result, actually rated recharge ahead of this project. See, Attachment DH-7. For these reasons, the PER is incomplete and inadequate basis to authorize Citizens to proceed without such an analysis.

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VII. THE CREDITABILITY OF THE PER IS ADVERSELY IMPACTED BY BENEFITS RECEIVED UNRELATED TO THE ACTUAL PURPOSE OF THE PLAN

Q. Are there benefits to the golf courses and the Recreation Centers derived from this project unrelated to benefits to the aquifer?

A. As discussed earlier in my testimony, participating golf courses in Sun City West must secure a replacement source of water by August 2005 for 1,405.27 af to meet annual demands. This project solves the need for securing a new source of water. Another option available to these golf courses is to take direct delivery of effluent, as originally planned when the General Industrial Use Permits were issued as a temporary bridge source. If all the effluent generated in Sun City West was directly delivered to golf courses, approximately 2,800 af of pumping could be eliminated at no cost to Citizens' ratepayers.

Another benefit to both Recreation Centers is lowering their costs to operate the golf courses. CAP water is being provided at 80% of their power costs to pump groundwater.

Q. How does the existence of these other factors impact the creditability of the PER?

A. In this instance, none of the contracting parties will ultimately be responsible for the costs of constructing, operating or maintaining the approved facilities, as it is my understanding that the construction costs, operation, maintenance and return will be recovered from rates imposed on Citizens' ratepayers. Therefore, there is no assurance that the parties are attempting to design the least cost alternative. As a result, items that ease operation, but are not truly necessary, such as a telemetry central supervision control and data acquisition control

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system, are included. Further, parties have no incentive to avoid imposing conditions that may increase costs (such as insisting that certain golf courses not participate, insisting that the respective CAP allocations are delivered to the golf courses in the service area having the allocation, or refusing to consider utilization of the existing effluent distribution system for West to East deliveries). The fact that the PER accepted these propositions with no real scrutiny emphasizes the dangers of having facilities designed by parties who are not ultimately responsible for paying either the construction or operating costs of the facilities they approve.

Q. What other aspects of Citizens' operations impact the aquifer?

A. Citizens relies almost exclusively on groundwater to meet its water demands. Therefore, its decisions to operate particular wells, to drill or abandon wells and to expand its service territories all impact the aquifer.

As indicated in Response to SCTA Data Request C-1.11, in 2000 Citizens commenced operating the Underground Storage Facility at the CWR water campus pursuant to Permit No. 71-534362.0001. This storage facility is permitted to store 3,041.5 af per year. During 2000, 2,896 af of reclaimed water was delivered to the facility. Response to SCTA Data Request C-1.12. Of that amount, 2,772.98 af was deemed stored. Response to SCTA Data Request C-1.11. The entire 2,772 af of effluent was recovered in 2000 as follows: Sun City Water Company ("SC") recovered 1,409.49 af; and SCW recovered 1,363.49 af. *Id.*

In addition, 701.27 af of long-term storage credits earned at the storage facility in previous years were recovered by SCW and delivered to the Deer Valley and

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Desert Trail Golf Courses in Sun City West. *Id.* Thus, while allegedly pursuing a 15 million dollar project to eliminate golf course pumping, the very effluent that was supposed to be utilized on golf courses in the first instance, is being "stored" and annually recovered by the two water companies, but only 20% of the recovered effluent is used to meet the demands of the golf courses.

Furthermore, the CAP water Citizens is "storing" in the MWD Storage Facility is also being recovered annually: 2,100 af of CAP water is being recovered annually by Citizens Utilities Agua Fria Division; 4,189 af of the CAP water is being recovered annually by SC; and another 2,372 af of CAP water is recovered annually by SCW. In short, Citizens is recovering every drop of water it is "storing," with no assurance of a net benefit to the aquifer.

Q. Did the PER evaluate benefits to the aquifer achievable through changes in Citizens' operations?

A. No.

VIII. THE PER FAILED TO EVALUATE INTEGRATING CAP DELIVERIES WITH OPERATION OF CITIZENS' SEWER TREATMENT PLANT AND UNDERGROUND STORAGE FACILITY

A. An Integrated Operation Plan Reduces Costs by $9,071,141 and Reduces Pumping More Than a Stand Alone CAP Delivery System

Q. Did the PER study integrating SWC's existing Sewer Treatment Plant and its Underground Storage Facility as part of a CAP delivery system?

A. No it did not.

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Q. Could you explain how the two systems could be utilized together?

A. Sun City West's golf courses were designed to take direct delivery of effluent. However, the quality of the effluent, in particular its nitrogen content, was unacceptable by the golf courses (PER at A-4). Thus, although a distribution system was in place, the golf courses refused to accept delivery of effluent. The PER did not evaluate whether a similar decision could be made after the CAP distribution water system is installed. The effluent recharge basins associated with the treatment plant were permitted as an Underground Storage Facility, allowing the accumulation of storage credits that could be recovered. Response to SCTA Data Request C-1.11. As noted above, the credits are currently being used to support delivery of water to only two Sun City West golf courses. The rest of the stored effluent is apparently being recovered and delivered elsewhere in the service areas of SC and SCW. Citizens Communications Co.-Agua Fria Division also holds storage and recovery permits for use at the storage facility, but according to the Response to SCTA Data Request C-1.11, these permits were not utilized in the year 2000.

Recently, Citizens acquired ownership of the treatment plant and has added or is adding a denitrofication component to the plant. This should substantially improve the water quality making it usable for direct delivery to the golf courses. Once the denitrofication component is operational, if it is not already, Citizens should be able to make direct deliveries to the Sun City West golf courses of effluent alone or, if any variation of one of the Alternatives is constructed, of a combination of effluent and CAP water. Under a normal year, the private and Recreation Center golf courses, in the Sun City West area have a demand of approximately 5,519 af (PER at B-11). Thus, the golf courses in Sun City West could take direct delivery of the approximate 2,800 af of effluent

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that is generated by the plant, supplemented by CAP water deliveries of approximately 2,719 af of the 6,561 af CAP allocation. This leaves 3,842 af of CAP water available. 3,041 af of this amount could be stored at the storage facility, subject to amending the Underground Storage Permit to allow storage of CAP water. Further, Citizens has indicated it believes the storage capacity of the facility could be increased somewhat, although they have done no studies to determine to what degree the storage facility could accommodate more storage during the year. Response to SCTA Data Request C-1.14. A study should be undertaken to determine the additional storage capacity of the existing Underground Storage Facility. It is possible the entire residual 801 af of the CAP allocation, or even a greater amount, could be stored at Citizens' existing Underground Storage Facility.

Q. If joint use is made of the existing Underground Storage Facility, what portions of the proposed Plan become unnecessary?

A. The Sun City distribution system and SCADA system costs would be eliminated from all Alternatives, with possible exception of Alternatives that use the existing effluent distribution system to carry CAP water West to East. This represents a savings of $9,071,141 on all Alternatives, directly benefiting all Citizens' ratepayers. To the extent all residual CAP water (up to 801 af) cannot be stored at Citizens' existing Underground Storage Facility, this residual CAP water could be stored at the Agua Fria recharge site. Joint use of the existing Underground Storage Facility will permit delivery of all or most of the CAP allocation into the Sun Cities' service areas. It likely would eliminate all pumping that currently occurs at all the Sun City West golf courses. A construction of a distribution line to the Willowcreek/Willowbrook Golf Courses, which have an annual demand of 1,329 af, could also be evaluated.

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This should eliminate the need to recharge any of the CAP allocation outside of the Sun Cities. However, the additional cost of this distribution system must be closely scrutinized to determine whether there are sufficient benefits to the aquifer or to the operations of the system associated with actual delivery of this additional CAP amount (801 af) versus the far less expensive option of recharge to justify the costs of extending the distribution system to the Willowcreek/Willowbrook Golf Courses.

Q. Would you summarize the benefits of this proposal?

A. Jointly using an Underground Storage Facility and maximizing direct deliveries of effluent would achieve the goal of getting Sun City West totally off pumps. It would use all available effluent directly, while bringing 5,800 af of CAP water, or more, into the Sun Cities' service areas. It eliminates the entire Sun City distribution system and the SCADA system. Further, it provides an interconnection with the CAP canal and a delivery system that could be utilized in the future if potable water supplies were necessary. The life cycle cost of all Alternatives would be reduced by $9,071,141, with the possible exception of those relying on the existing effluent system to carry CAP water West to East.

IX. USE OF STORED WATER AND WATER CREDITS NEEDS TO BE RESTRICTED

Q. Do you have any recommendations regarding recovering water stored at a joint use Underground Storage Facility?

A. Since the goal is to maximize benefits to the aquifer, Citizens should not be able to recover or transfer any of the water stored at the facility if doing so increases the amount of pumping that would otherwise be allowed. The Commission, in Decision No. 62293, ordered that "approval of the use of CAP

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water is conditioned upon water credits not being utilized in a manner that would result in additional groundwater depletion in the Sun Cities area." As set forth earlier in my testimony, Citizens is accounting for all stored water as recovered on an annual basis and thus avoiding the accrual of "water credits". To eliminate this loophole in Decision No. 62293, the Commission should order use of stored water by SC or SCW (of any source) and any water credits earned thereby be limited to addressing conservation related penalties imposed on existing customers unless otherwise ordered by the Commission. This limitation will preserve the stored water for the benefit of existing Citizens customers.

X. THE USE OF THE BEARDSLEY CANAL WAS NOT PROPERLY EVALUATED BY THE PER

Q. Are there any other alternatives that you believe the PER failed to properly examine?

A. The PER analysis of the use of the Beardsley Canal and the existing system to deliver waters East to West is also inadequate.

Q. Please explain the PER's inadequacies in analyzing the Beardsley Canal.

A. The PER fails to adequately examine the use of the Beardsley Canal in lieu of a new CAP trunk line and the cost estimates associated with its use are not based upon any firm negotiations. Citizens met with MWD only one time. Response to SCTA Data Request C-1.15. MWD expressed significant interest in wheeling water for Citizens. *Id.* However, the use of the Beardsley Canal was rejected in the PER on the following basis:

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> **"The Beardsley Canal currently does not convey water during four months of the year. Until this changes, the GSP will have to use all of its allotment in eight months instead of twelve. This scenario would require an increased trunk pipe size and an increase in the size of pumps at the booster pump station required for all of the Beardsley Canal Alternatives, above that which was estimated in this study.** This enlarged system would then be inactive for four months of the year. **This effectively eliminates Alternative B as long as the MWD continues to undergo an annual dry-up in the Beardsley Canal."** (Emphasis in original.)

An identical statement was set forth relating to Alternative D and would also apply to Alternatives C and E, to the extent they rely on the Beardsley Canal.

Q. Do you agree with this assessment of the Beardsley Canal and its impact on the Alternatives that utilize the Canal?

A. No. The PER contains no analysis to support this broad negative conclusion. There is no indication that MWD would not be willing to shorten the dry-up period considerably. It should be noted that the Salt River Project used to have a much longer dry-up period. However, as non-agricultural water demand increased, the dry-up period has been shortened and now averages approximately two weeks. In view of MWD's adoption of a general wheeling policy and expression of interest to participate in this particular project, there should have been further exploration with MWD before summarily rejecting the option. Typical maintenance requirements in the northern portion of the Beardsley Canal could be performed much more quickly than the current four month dry-up period.

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Q. Is the Beardsley Canal rendered nonviable if the current dry-up period is continued?

A. Only 480 af are used on the participating golf courses in the months of December, January and February. An additional 421 af is utilized on the participating golf courses in November (See, PER at B-11). To the extent this volume of water cannot be delivered in the remaining eight months with the system as designed, it could be recharged in the Agua Fria Recharge Facility. Furthermore, the delivery system being designed will operate for many years. The dry-up period can be anticipated to be reduced over time, which will eliminate or minimize issue.

Q. Does the PER's treatment of the Beardsley Canal reflect a basic flaw with the PER?

A. Yes. This aspect of the PER illustrates the adverse impacts created by assuming certain golf courses will not participate and the system must be designed to ensure that every acre foot of CAP water can be delivered every year to the designated golf courses and used proportionately on the participating golf courses. The system should be designed to optimize CAP water deliveries while minimizing costs to Citizens' ratepayers. This is accomplished by maximizing the use of existing infrastructure and maximizing deliveries to the closest golf courses. The Agua Fria Recharge Facility should be integrated into the Plan to minimize oversizing and to provide operational flexibility. The PER failed to follow any of these guidelines for optimizing CAP water deliveries at the least cost to Citizens' ratepayers.

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XI. IMPROPER OR INADEQUATE TREATMENT OF WHEELING COSTS, BOOSTER STATION COSTS AND RIGHT-OF-WAY COSTS SKEWED THE RECOMMENDATION TOWARD ALTERNATIVE "A"

Q. Do you have any other problems with the Beardsley Canal analysis?

A. The wheeling cost associated with the Beardsley Canal option constitutes a $2,686,025 component to the life cycle cost to Alternatives B, C, D and E. This cost is computed at the wheeling rate of $25 per acre foot. However, neither the PER nor the Responses to Data Requests indicate any negotiations were conducted concerning the wheeling rate. The wheeling cost may be able to be reduced sufficiently such that the life cycle costs for Alternatives B and C would be equal to or lower than Alternative A, even before taking into account the other adjustments I discuss below.

Q. Are there other issues in the comparison of costs that you have identified?

A. Pages E-3 and E-4 of the PER indicate a life cycle cost for the booster pump station of $1,591,400 composed of $476,873 in construction costs and $1,114,527 in operation and maintenance costs. However, the booster pump station summary contained on page D-47 of the PER reflects total life cycle costs of $1,157,073 composed of capital costs of $307,660 and O&M costs of $849,413. Yet, a lower cost for the booster pump station is reflected in each of the various Alternatives (PER at D-14, D-16 and D-18) where a capital cost of $307,660 and a present worth O&M of $125,954 is utilized. Thus, the comparative summary on pages E-3 and E-4 overstates the costs associated with the booster pump station from a high of $1,157,786 (if the individual estimates are utilized) or by $434,327 (if the booster pump station summary contained on page D-47 is utilized).

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Q. Have you identified any other costs that may affect the comparison of the Alternatives?

A. The manner in which right-of-way is treated in the various Alternatives is not fully explained and appears to be inconsistent. For Alternative A, the PER at D-12 indicates right-of-way costs could be as low as $50,000 if, but only if, Peoria successfully obtains the right-of-way. Otherwise, the right-of-way cost estimate ranges from a low of $152,000 to a high of $555,000. The cost summary for Alternative A, set forth on page D-13, uses right-of-way costs of $100,000. Therefore, it is possible that the Alternative A cost summaries on pages E-3 and E-4 underestimate right-of-way costs by as much as $455,000 based upon the estimates contained in the PER.

In contrast, the right-of-way costs for Alternatives B, C and D all use values significantly greater than the highest estimated right-of-way acquisition cost contained in the text of the PER. For example, at page D-14, costs for easement or right-of-way acquisition for Alternative B are estimated to range from $49,000 to $68,000. The summary uses a value of $116,000. Page D-15 estimates right-of-way costs for Alternative C to range between $60,000 to $90,000. The summary of costs utilizes right-of-way costs of $150,000. Similarly, the actual estimate of right-of-way costs for Alternative D, reflected on page D-7, is $80,000 to $120,000, but the summary utilizes a value of $200,000. By overestimating the right-of-way costs for Alternatives B, C and D, while using a low estimate for right-of-way costs for Alternative A results in a disparity in the cost summary of Alternative A relative to Alternatives B, C and D by as much as $535,000. This coupled with the improper use of the booster station costs reflects an overestimate of Alternatives B, C and D relative to Alternative A by as much as $964,327. If a lower wheeling rate is also

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negotiated, Alternatives B, C and D could be over priced, relative to Alternative A, by more than 2 million dollars each. After these adjustments, Alternatives B and C would be cheaper than Alternative A, warranting additional evaluation.

XII. THE EVALUATION OF ALTERNATIVE "E" WAS INADEQUATE

Q. The PER at D-45 indicates the hydraulics of the existing effluent system would not accommodate the flow of the entire CAP allocation for the Sun Cities without "nearly a complete reconstruction of the entire system". How do you respond to this contention?

A. I have not performed a separate hydraulic analysis and it is clear from the analysis included in the PER that there are some constraints associated with merely connecting a new CAP transmission line to the existing system along Johnson Boulevard. However, the analysis should not have ended there. While HDR did perform some hydraulic analysis with improvements necessary to accommodate direct delivery of effluent to the Deer Valley Golf Course, no attempt was made to identify the impacts of specific improvements to the existing system or alternative connection points in an effort to address constraints to moving CAP water West to East. (See Attachment DH-8.). Therefore, the PER is inadequate and insufficient to justify eliminating Alternative E.

Q. Please explain further how the PER should have studied Alternative E.

A. From Figure D-4, Appendix F and Responses to SCTA Data Requests, it appears the hydraulic study examined delivering the entire CAP allocation at a connection on Johnson Boulevard with no improvements to the existing system. When this run identified constraints, a run could have been, and should have been made reflecting alternatives, such as: 1) installation of a 14 inch line from

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Johnson Boulevard south along Tanglewood Drive and 150th to connect with the existing system at the Grandview Golf Course; or 2) installation of the new 24 inch line along the Grand Avenue alignment past Johnson Boulevard to Meeker Boulevard, and into Meeker Boulevard and connecting with the 16 inch and 14 inch lines located on Meeker. Either of these modifications should significantly improve the hydraulics of the existing system with flows traveling West to East. A few additional internal improvements could also be evaluated such as new short interconnections (a) along Trail Ridge Drive; (b) along Echo Mesa and Greenview; and (c) within Hillcrest. A depiction of the location of these various improvements is attached as Attachment DH-9. These improvements would create an internally looped system and should significantly improve the existing system hydraulics making Alternative E viable. These improvements do not constitute "nearly a complete reconstruction of the entire system" as the PER suggests would be required.

Q. Do you have any estimates of the amount of water such a system could likely handle?

A. As shown by Alternative D and Alternative A, the PER has concluded that an unpressurized gravity flow 24 inch line is sufficient to handle the entire Sun Cities' allocation. Here you would have a 16 inch line looped with primarily a 14 inch line (with some 12 inch line). A combination of these two lines should more than adequately handle the entire 6,561 af of Sun Cities' allocation if desired. A booster station may, however, be required if the head from the Beardsley Canal or a joint facility with the Agua Fria Division and/or the City of Surprise is inadequate.

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Q. Do these improvements provide operational flexibility?

A. With these improvements, it may be possible to operate the system as a totally CAP system at times, running from West to East; a totally effluent system at times, running from East to West; or even to deliver effluent East to West, while delivering CAP water West to East. Such an operation, like the proposal to use the existing Underground Storage Facility as a joint facility in combination with direct deliveries of effluent, should allow for total or almost total elimination of all pumping by golf courses in Sun City West.

Q. What portions of the proposed system become unnecessary under this Alternative?

A. Under this scenario, the entire recommended Alternative A becomes unnecessary. Instead, a new Alternative E is utilized in conjunction with use of the Beardsley Canal or a joint facility with the Agua Fria Division and/or the City of Surprise.

Q. Have you estimated the cost of your revised Alternative E?

A. No. Until a hydraulic model is run identifying actual flows that could be expected and identifies which of the possible improvements should be made, it is premature to perform a cost analysis.

XIII. A SCADA SYSTEM IS NOT WARRANTED

Q. Do you agree with the PER's conclusion that a Telemetry Central Supervision Control And Data Acquisition ("SCADA") control system is required for this project?

A. If money is no object, such a SCADA system optimizes the convenience to the operator. However, such a system is not mandatory. It should be noted that the

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RWDS in Scottsdale, which serves 20 golf courses, was designed and installed without a telemetry SCADA system. Here, the need is far less.

Q. Please explain why the need for telemetry SCADA system is less with the present system than in the Scottsdale system.

A. Primarily because this project is a gravity system that operates on a demand basis for golf course turnouts. The RWDS in Scottsdale is a series of pump stations transporting water up hill. Additionally, the Sun City and Sun City West golf courses already have significant experience with operations. There is significant historical data to assist in making annual and monthly estimates of water demand, and experienced golf course personnel who have been adjusting lake levels, in some instances for decades. All that is required is that these persons communicate their water needs in a timely and uniform fashion so that orders can be properly placed with the CAWCD and possibly MWD. The golf course personnel would be required to operate the valves so that waters are directed appropriately to the lakes in a timely fashion. Again, the golf courses already have personnel on staff responsible for monitoring lake levels and operating the golf course wells. The operation of the valving and placing orders is no more complicated and should require no additional personnel.

Q. Will the entire cost of the SCADA system be eliminated?

A. No. Certain components will be totally eliminated, such as the remote RTU/Radio Sites, the FCC License Application Fee, and the Radio Line of Sight Study. The meters, meter vaults and valving would still be required; however, manually operated meters and valving are significantly cheaper than radio operated components. Further, my proposals eliminate entirely the distribution system for the Sun Cities areas together with the proposed SCADA

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system. This eliminates $712,802 of the estimated capital cost of $1,218,399 for a joint SCADA system. Since the operation of the valves would be the responsibility of the golf courses, there would be very little operation expense associated with manually controlled valves. There would be some maintenance.

XIV. THE SUPPLEMENT'S CONTRADICTION OF THE PER, DEMONSTRATES THE UNRELIABILITY OF THE PER

Q. The PER indicates that its analysis has determined that without the participation of the two private golf courses in Sun City West, the GSP will not be operationally feasible (PER at A-4). A Supplemental Engineering Report was provided by Citizens to refute the conclusion in its own Report. Does the Supplement demonstrate that the GSP proposed by Citizens will be possible should Hillcrest Golf Course decide not to participate?

A. The Supplement provides no new data that was not available and discussed in the PER. The fact that upon further evaluation of the same data previously available to its consultant, Citizens has reached a contrary conclusion to the consultant should raise significant concerns regarding the thoroughness of the PER in the first instance. Secondly, it evidences how the same data can be utilized to justify different conclusions depending on the goal trying to be achieved. Clearly, Hillcrest Golf Course's lack of participation will reduce the operating tolerances of the Sun City West system. It emphasizes the need to have all Sun City West golf courses participate. Participation by the Desert Trail and Deer Valley Golf Courses, as I have suggested, will also provide operational flexibility. Further, if Citizens participates in the Agua Fria recharge, it can immediately notify CAWCD to divert its deliveries to the Agua Fria Recharge site and thereby minimize the onsite storage that is necessary.

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XV. THE EVALUATION OF JOINT PROJECTS WAS INCOMPLETE

Q. Did the PER adequately address the feasibility of joint participation with the Agua Fria Division and the City of Surprise?

A. The evaluation reflected in the PER is not an in-depth analysis. However, the study presented indicates that participation with one or both of these entities will substantially reduce the cost of bringing CAP water to the Sun City West service area as compared with constructing the Alternative A trunk line. The scenario that was not evaluated, however, was limiting CAP deliveries to those that could be made utilizing the existing effluent system in a West to East direction. Nor is there an evaluation of whether the pump station, if required, can be operated as a joint facility thereby significantly reducing the cost to the Sun Cities.

XVI. RECOMMENDATIONS

Q. Do you recommend proceeding with any of the Alternatives presented in PER and Supplement at this time?

A. No. I do not believe the PER and Supplement provide a sufficient basis to proceed with any of the Alternatives reviewed by the PER. Serious questions remain regarding all the Alternatives identified in the PER. Further, the PER did not evaluate the hydrologic impact of the various Alternatives and failed to consider viable options such as joint use of Citizens' existing Underground Storage Facility and the Alternative E I have discussed in my testimony. Under these circumstances, I would recommend that the Commission require Citizens to continue to recharge the CAP water at the present time. I would also recommend the Commission closely scrutinize the manner in which Citizens is

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recovering the water being stored through recharge of both CAP water and effluent and place tighter limitations thereon.

Q. If the Commission decides to proceed with some sort of direct delivery option, do you have a recommendation?

A. Because of the uncertainties with the existing PER and Supplement, I would advise the Commission to proceed very cautiously and to authorize construction in phases. Before authorizing any new construction, I recommend Citizens further evaluate the existing distribution system and quantify the amount of delivery that could be made if it were looped so that the flows could travel in either direction. Because use of the existing Beardsley Canal turnout close to Grand Avenue offers the best opportunity to minimize capital costs, I recommend that option be further analyzed, including negotiating an actual wheeling price with MWD.

If the use of the existing distribution system is demonstrated to be unworkable after an adequate analysis is performed and if the cost of wheeling is not significantly reduced after actual negotiations with MWD, then I recommend proceeding with the Alternative A pipeline in conjunction with Citizens' existing Underground Storage Facility and the Agua Fria Storage Facility.

Under no circumstances would I recommend allowing construction to commence on the $7.3 million distribution system in Sun City or the $1.7 million SCADA system until there is sufficient experience in operating the Sun City West portion of the system to identify both operational problems and whether there really is a need for participation by Sun City golf courses and a SCADA system. This would probably take at least three years of operation in

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Sun City West. Thereafter, if a distribution system could be justified in Sun City, I would require the system to be designed so that both Recreation Centers and private golf courses are able to participate and that deliveries to the northernmost golf courses be maximized before any system is constructed below Bell Road.

Q. Does this conclude your testimony?

A. Yes.

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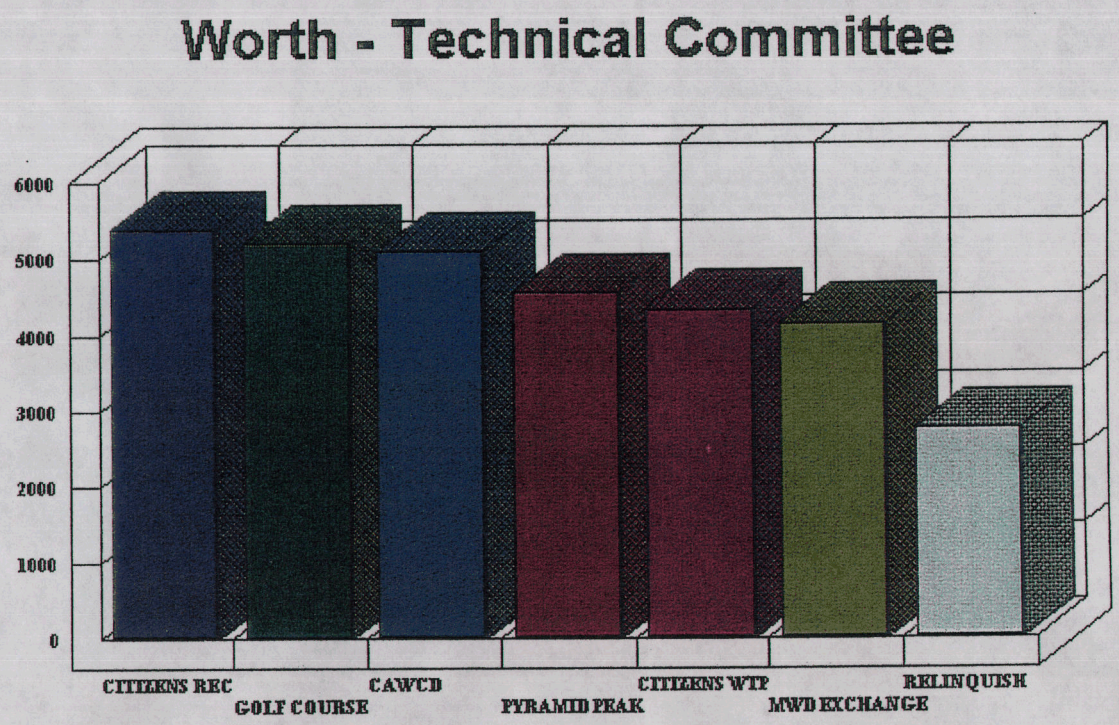
UPON EXPIRATION OF GENERAL INDUSTRIAL USE PERMITS
(AUGUST 2005)

Golf Course	Annual Demand	Type 1 or Type 2 Rights	Excess/ (Deficiency)
Stardust & Echo Mesa:	1,021	417	(604)
Grandview:	761	368.5	(392.5)
Pebblebrook:	689	753	64
Trail Ridge:	539	306.38	(232.62)
Briarwood:	725	484.85	(240.15)
TOTALS	**3,735**	**2,329.73**	**(1,405.27)**

Attachment DH-6

For both communities, the direct use of CAP water for golf course irrigation was the preferred option followed by the CAWCD Recharge Project and the Citizens Recharge Project. Relinquishment was least preferred.

During the ranking process, concern was expressed by a few Task Force members that some participants were voting for their favorite water-use option, rather than objectively ranking how well each option performed against the criteria. To understand the effect of this perceived situation, a Technical Team, consisting of Kerry Brough and Marvin Glotfelty, both of Brown & Caldwell, and Terri Sue C. Rossi of Citizens, developed detailed definitions for each of the "one to nine" levels for the criteria (see Appendix M). Based on these definitions, the Technical Team consistently rated each of the options against the criteria. The technical ratings were combined with the criteria weights assigned by the Task Force, and the results are shown below.



The most significant difference between the Task Force and Technical Team's results was the effect of a higher rating of ***direct benefits*** for the recharge options by the

technical team. They also rated ***used and useful*** lower on the CAWCD option than the Task Force did, while rating ***regulatory compliance*** higher overall.

The results of the Technical Team substantially reaffirmed the selection of the top three options. The Citizens Recharge Facility came out slightly above the Golf Course option followed by the CAWCD Recharge Project. These results also coincided with the feedback from the public at the open houses. People who responded to the open house questionnaire from both Sun City and Sun City West open houses preferred the golf course irrigation option followed by the Citizens Recharge and the CAWCD Recharge options. Only five out of 103 respondents to the open house questionnaire said to relinquish the allocation.

V. Recommendation

At their meeting on May 19, 1998, the Task Force recommended a combination of options that will fulfill the long and short-term needs of the Sun Cities (see 5/19/98 meeting notes). Termed the Sun Cities/Youngtown Groundwater Savings Project, the Task Force recommended that CAP water be delivered to the Sun Cities through a non-potable pipeline. The CAP water would then be used to irrigate golf courses that have historically pumped groundwater. By doing this, every gallon of groundwater not pumped by the golf courses would be preserved for delivery to drinking water customers in the Sun Cities. Assuming the Arizona Corporation Commission approves the Task Force recommendation this year, the project could be completed by 2002.

While the Task Force recommended that Citizens proceed immediately with permitting and designing the groundwater savings project with the local golf courses, the Task Force realized that an interim solution was required to resolve the issue of CAP water being "used and useful". Until the golf course project is completed, the Task Force recommended that Citizens recharge the CAP water at the existing MWD Groundwater Savings Project or, if not available, at the CAWCD Agua Fria Recharge Project, once

Sun City West Models

Model 1 - Model number 1 illustrates the existing systems at 50% of July daily demand. Delivery is available for all non-expansion courses. Flow will need to be further restricted to match ideal flow in mainline pipe (15cfs).

Model 2 - The second model simulates an additional 16" pipe along Stardust Blvd to convey CAP water. The new pipe has been over designed to allow 20% more flow. Delivery is available for all non-expansion courses at 50% of July daily demand. Flow will need to be further restricted to match ideal flow in mainline pipe (15cfs).

Model 3 - This run adds effluent from the water treatment plant which is to be conveyed to the expansion courses (Deer Valley and Desert Trails). Additional 12" pipe is needed to connect expansion courses to the system along 151st Avenue. Full demand of the expansion courses is modeled and additional investigation into effluent supply is need to determine if it can be supplied. All non-expansion courses have CAP water delivery at 50% of July daily demand. CAP flow will need to be further restricted to match ideal flow in mainline pipe (15cfs).

Model 4 - The fourth simulation is similar to Model 3 however an additional 16" pipe has been added along Stardust Boulevard. The pipe has been over designed to accommodate an extra 20% of flow.

Model 5 - This simulation is an expansion to Model 4 by replacing the delivery to Deer Valley with a new delivery pipe along 135th Avenue (Deer Valley 2). The 12" pipe delivers to the southeast corner of the golf course.

Model 6 - Model 6 is similar to Model 5 except the new pipe along Stardust Boulevard is 20" in diameter.

Model 7 - This run includes effluent from the water treatment plant and delivery to Deer Valley Golf Course from the new pipe along 135th Avenue. Full demand of the expansion courses is modeled and additional investigation into effluent supply is needed to determine if it can be supplied. All non-expansion courses have CAP water delivery at 50% of July daily demand. Flow times have been adjusted to lower hourly peak The pipe along Stardust Boulevard is 16" in diameter. CAP flow will need to be further restricted to match ideal flow in mainline pipe (15cfs).

Model 8 - This run includes effluent from the water treatment plant. Additional pipe is needed along 151st Avenue to connect expansion courses to the distribution system. 50% of July peak daily demand for the expansion courses is modeled and additional investigation into effluent supply is needed to determine if it can be supplied. All non-expansion courses have CAP water delivery at 50% of July daily demand. CAP flow will need to be further restricted to match ideal flow in mainline pipe (15cfs).

Model 9 - This run includes effluent from the water treatment plant and delivery to Deer Valley Golf Course from the new pipe along 135th Avenue. 50% of July peak daily demand for the expansion courses is modeled and additional investigation into effluent supply is needed to determine if it can be supplied. All non-expansion courses have CAP water delivery at 50% of July daily demand. The pipe along Stardust Boulevard is 16" in diameter. CAP flow will need to be further restricted to match ideal flow in mainline pipe (15cfs).

Sun City Model

One model was run to size the new pipes needed for the distribution system. The design reflects a 20% over design. Final flows will fluctuate on any given day based on golf course demand and CAP supply. All recreation courses and Maricopa Lake have CAP water delivery at 75% of July daily demand.

Final Model

The final model simulates the Sun City Model and the Sun City West Model 7 combined and reduced total flows to approximately match the mainline alternative design flows (15cfs).

	SUN CITY WEST MODELS								
	1	2	3	4	5	6	7	8	9
Max CAP Flow Through Mainline Pipe A (cfs)	16.1	16.1	16.1	16.1	16.1	16.1	15.6	15.8	16.1
Min HGL @ Start of Sun City West System (ft)	1357.4	1357.4	1357.7	1357.7	1357.7	1357.7	1365.6	1357.6	1357.6
Max HGL @ Start of Sun City West System (ft)	1392.3	1392.3	1392.5	1392.5	1392.5	1392.5	1407.9	1392.4	1392.4
Sun City Delivery (cfs)	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
Effluent Added (cfs)	0.0	0.0	3.3	3.3	3.3	3.3	3.3	1.7	1.7
Stardust Min Delivery Pressure (psi)	56.6	56.6	51.7	51.7	51.7	51.7	56.0	56.4	54.4
Stardust Max Delivery Pressure (psi)	73.7	73.7	69.8	69.8	69.8	69.8	78.4	71.9	69.1
Briarwood Min Delivery Pressure (psi)	50.8	50.8	44.5	44.5	44.5	44.5	48.9	47.9	47.9
Briarwood Max Delivery Pressure (psi)	69.7	69.7	64.8	64.8	64.8	64.8	72.9	67.5	63.7
Hillcrest Min Delivery Pressure (psi)	38.2	38.2	31.9	31.9	31.9	31.9	36.3	35.3	35.3
Hillcrest Max Delivery Pressure (psi)	58.0	58.0	53.1	53.1	53.1	53.1	61.2	55.8	55.8
Pebblebrook Min Delivery Pressure (psi)	60.9	63.4	47.8	55.0	55.8	56.8	60.7	77.1	59.9
Pebblebrook Max Delivery Pressure (psi)	81.7	82.8	71.3	76.1	76.6	77.4	84.7	55.0	80.0
Deer Valley Min Delivery Pressure (psi)	**	**	ND	ND	**	**	**	ND	**
Deer Valley Max Delivery Pressure (psi)	**	**	ND	14.0	**	**	**	23.5	**
Deer Valley 2 Min Delivery Pressure (psi)	**	**	**	**	13.9	17.4	18.7	**	22.9
Deer Valley 2 Max Delivery Pressure (psi)	**	**	**	**	36.0	38.4	44.1	**	43.7
Echo Mesa Min Delivery Pressure (psi)	28.7	38.5	ND	31.5	28.2	31.6	32.9	15.5	33.9
Echo Mesa Max Delivery Pressure (psi)	55.6	58.7	28.7	48.5	50.4	52.7	58.5	44.6	55.2
Grandview Min Delivery Pressure (psi)	32.0	40.0	1.9	27.3	29.8	36.1	36.2	19.1	35.5
Grandview Max Delivery Pressure (psi)	58.4	61.0	35.8	51.7	53.3	55.2	61.4	49.1	57.8
Trail Ridge Min Delivery Pressure (psi)	13.5	23.4	ND	ND	7.8	11.8	11.1	ND	17.0
Trail Ridge Max Delivery Pressure (psi)	41.4	44.6	7.5	27.8	36.3	38.6	44.4	28.5	41.1
Desert Trails Min Delivery Pressure (psi)	**	**	ND	ND	ND	2.1	1.4	ND	13.7
Desert Trails Max Delivery Pressure (psi)	**	**	ND	15.5	35.4	37.7	43.6	ND	40.3

Model 1 - No Effluent and No New Pipes
Model 2 - No Effluent and New Starduct Blvd Pipe
Model 3 - 3.3 cfs Effluent - Full Demand, No Stardust Blvd Pipe
Model 4 - 3.3 cfs Effluent-Full Demand and No New Deer Valley2 Delivery
Model 5 - 3.3 cfs Effluent-Full Demand and New Deer Valley2 Delivery
Model 6 - 3.3 cfs Effluent - Full Demand , New Deer Valley2 Delivery and 20" Starduct Blvd Pipe
Model 7 - 3.3 cfs Effluent-Full Demand, New Deer Valley2 Delivery, Change in Flow Times and 16" Stardust Blvd Pipe
Model 8 - 1.65 cfs Effluent-50% Demand and No Stardust Blvd Pipe
Model 9 - 1.65 cfs Effluent-50% Demand, New Stardust Blvd Pipe and Deer Valley2 Delivery

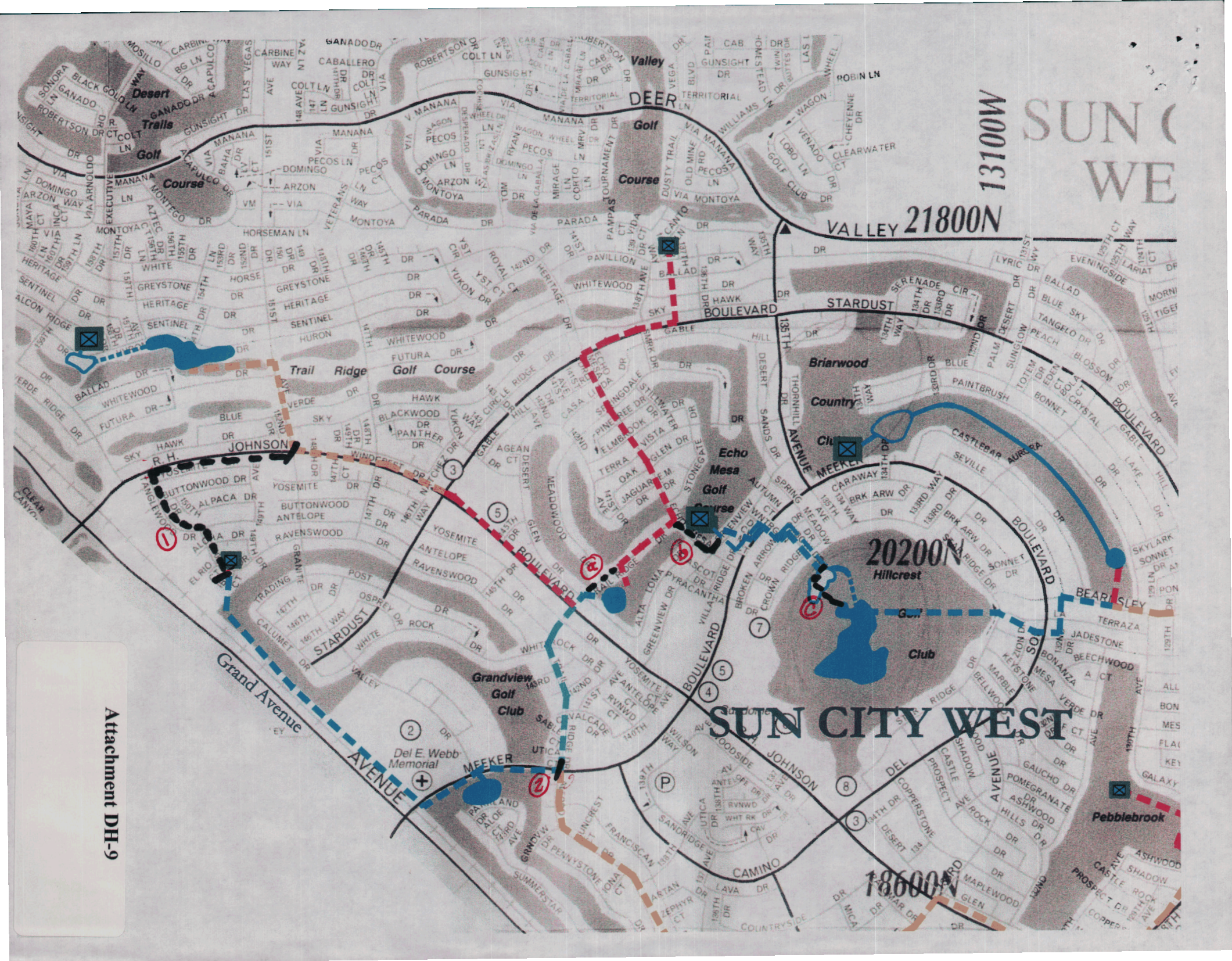
All Numbers based on 50% July Peak CAP Demand
ND - No Delivery Allowed Due to Negative Pressures

** No Demand

Facility Annual Totals

Facility	Acrefeet / year*	Peak daily usage**	Peak demand (cfs) July	Ave demand (cfs)	Low Demand (cfs) January
Sun City Rec Center;					
Lakes East/Viewpoint Lake	594	3.56	1.79	0.82	0.14634
Lakes West/Dawn Lake	863	5.17	2.61	1.19	0.21138
North GC	623	3.73	1.88	0.86	0.14634
Quail Run GC	231	1.38	0.70	0.32	0.06504
Riverview GC	447	2.68	1.35	0.62	0.11382
South GC	819	4.91	2.48	1.13	0.19512
Willowcreek/Willowbrook	1329	7.96	4.01	1.83	0.3252
Sun City Private Clubs;					
Palmbrook CC	613	3.67	1.85	0.85	0.14634
Sun City CC	533	3.19	1.61	0.74	0.13008
Union Hills CC	729	4.37	2.20	1.01	0.17886
Maricopa Lake*****	15	0.09	0.05	0.02	0
Sun City West Rec Center;					
Deer Valley GC***	546	3.27	1.65	0.75	0.13008
Desert Trails GC****	469	2.81	1.42	0.65	0.11382
Echo Mesa GC***	592	3.55	1.79	0.82	0.14634
Grandview GC	761	4.56	2.30	1.05	0.19512
Pebblebrook GC	689	4.13	2.08	0.95	0.1626
Stardust GC	429	2.57	1.30	0.59	0.11382
Trail Ridge GC	539	3.23	1.63	0.74	0.13008
Sun City West Private Clubs;					
Briarwood CC	725	4.34	2.19	1.00	0.17886
Hillcrest GC	769	4.61	2.32	1.06	0.19512
TOTAL	12315	73.78	37.20	16.99	3.04062

* - 6-year data (93-98)
** - average July daily usage X 1.10
*** - 4-year data (95-98)
**** - 3-year data (96-98)
***** - 2-year data (96&99)
Data source – Arizona Dept of Water Resources



Attachment DH-9